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1.a)

$$4x_1 + 3x_2 + 2x_3 - x_4 = 10$$

$$x_1 + 2x_2 + 3x_3 + 4x_4 = 5$$

$$x_1 - x_2 - x_3 - x_4 = -1$$

$$x_1 + x_2 + x_3 + x_4 = 3$$

Gauss Seidel

Interação	X1	X2	X3	Erro
01	2.5	1.250	2.250	4.677
02	-0.312	5.281	-1.593	6.769
03	0.757	6.019	-5.402	5.254
04	1.471	3.586	-4.255	3.618
05	2.487	3.244	-1.955	3.909
06	0.849	6.561	-3.935	4.206
07	-0.572	9.641	-8.738	6.668
08	0.305	10.115	-11.480	3.231
09	1.667	10.768	-12.159	2.127
10	1.184	14.700	-15.239	5.031

Jacob

Interação	X1	X2	X3	Erro
01	2.5	2,5	1,0	4,743
02	0.875	-6,25	-2,0	11,144
03	7.437	11,062	11,225	26,342
04	-8.765	-38,656	-13,0	68,450
05	31.335	79,632	57,515	169,355
06	-70.126	-226,285	-110,718	429,629
07	186.202	534,610	322,642	1078,796
08	-457.246	-1394,826	-757,539	2721,7172
09	1167.275	3448,341	1979,035	6850,4809
10	-2920.120	-8774,915	-4892,677	17264,234

b)

$$x_1 + 2x_2 + 3x_3 + 4x_4 = 10$$

$$2x_1 + x_2 + 2x_3 + 3x_4 = 7$$

$$3x_1 + 2x_2 + x_3 + 2x_4 = 6$$

$$4x_1 + 3x_2 + 2x_3 + x_4 = 5$$

Gauss-Seidel

Iteração	X1	X2	X3	Erro
01	10,0	-13,0	2,0	16,522
02	30,0	-57,0	30,0	56,0
03	50,0	-141,0	146,0	156,563
04	110,0	-313,0	430,0	446,210
05	770,0	-1325,0	1058,0	1610,505
06	435,0	-7161,0	3710,0	7641,063
07	16350,0	-30477,0	18034,0	30858,087
08	4987,0	-103545,0	78990,0	107084,189
09	157410,0	-332333,0	286082,0	362978,751
10	1325503,0	-1209017,0	950750,0	1325503,625

Jacob

Iteração	X1	X2	X3	Erro
01	10,0	7,0	6,0	14,491
02	22,0	-25,0	-38,0	92,779
03	174,0	127,0	122,0	382,956
04	-610,0	-585,0	-770,0	1910,266
05	3490,0	2767,0	3006,0	8674,772
06	-14542,0	-12985,0	-15998,0	41635,445
07	73974,0	61087,0	69602,0	193189,312
08	-330970	-287145,0	-344090,0	915833,18
09	1606570,0	1350127,0	1567206,0	4283080,0
10	-7401862,0	-6347545	-7519958,0	20205042,0

c)

$$x_1 - 0.25x_2 - 0.25x_3 = 0$$

$$-0.25x_1 + x_2 - 0.25x_4 = 0$$

$$-0.25x_1 + x_3 - 0.25x_4 = 0.25$$

$$-0.25x_2 + x_4 = 0.25$$

Gauss-Seidel

Iteração	X1	X2	X3	Erro
01	0,0	0,0	0,25	0,25
02	0,0625	0,015625	0,265625	0,066291
03	0,070313	0,017578	0,267578	0,008286
04	0,071289	0,017822	0,267822	0,001036
05	0,071411	0,017853	0,267853	0,000129
06	0,071411	0,017853	0,267853	0,0000
07	0,071411	0,017853	0,267853	0,0000
08	0,071411	0,017853	0,267853	0,0000
09	0,071411	0,017853	0,267853	0,0000
10	0,071411	0,017853	0,267853	0,0000

Jacob

Interação	X1	X2	X3	Erro
01	0,0	0,0	0,25	0,35355
02	0,062	0,0	0,25	0,257694
03	0,062	0,01562	0,2656	0,250975
04	0,070	0,01562	0,2656	0,254026
05	0,070	0,01757	0,2675	0,253921
06	0,0712	0,01757	0,2675	0,254396
07	0,07128	0,01782	0,2678	0,254395
08	0,07141	0,01782	0,2678	0,254456
09	0,07141	0,01785	0,2678	0,254456
10	0,07142	0,17853	0,2678	0,254463

d)

$$4x_1 + x_2 + x_3 + x_4 = 7$$

$$2x_1 - 8x_2 + x_3 - x_4 = -6$$

$$x_1 + 2x_2 - 5x_3 + x_4 = -1$$

$$x_1 + x_2 + x_3 - 4x_4 = -1$$

Gauss-Sedeil

Interação	X1	X2	X3	Erro
01	1,75	1,1875	1,025	2,3501
02	1,1968	1,1773	0,9103	0,5649
03	1,2280	1,1708	0,9139	0,0320
04	1,2288	1,1714	0,9143	0,0010
05	1,2285	1,1714	0,9142	0,0002
06	1,2285	1,1714	0,9142	0,0000
07	1,2285	1,1714	0,9142	0,0000
08	1,2285	1,1714	0,9142	0,0000
09	1,2285	1,1714	0,9142	0,0000
10	1,2285	1,1714	0,9142	0,0000

Jacob

Interação	X1	X2	X3	Erro
01	1,75	0,75	0,2	1,9306
02	1,5125	1,2125	0,85	1,2443
03	1,2343	1,2343	0,9875	1,1852
04	1,1945	1,1820	0,9406	1,1169
05	1,2193	1,1662	0,9117	1,0800
06	1,2305	1,1687	0,9103	1,2305
07	1,2302	1,1714	0,9136	1,2302
08	1,2287	1,1717	0,9146	1,2287

09	1,2284	1,1715	0,9144	1,2284
10	1,2285	1,1714	0,9142	1,0785

e)

$$5x_1 - x_2 + 2x_3 - x_4 = 5$$

$$x_1 + 9x_2 - 3x_3 + 4x_4 = 26$$

$$3x_2 - 7x_3 + 2x_4 = -7$$

$$-2x_1 + 2x_2 - 3x_3 + 10x_4 = 33$$

Gauss-Seidel

Interação	X1	X2	X3	Erro
01	1,0	2,7777	2,1904	3,6761
02	0,6793	3,5435	2,5186	0,8927
03	0,7012	3,6505	2,5645	0,1184
04	0,7043	3,6654	2,5709	0,0165
05	0,7047	3,6675	2,5718	0,0023
06	0,7047	3,6678	2,5719	0,0003
07	0,7047	3,6678	2,5719	0,0000
08	0,7047	3,6678	2,5719	0,0000
09	0,7047	3,6678	2,5719	0,0000
10	0,7047	3,6678	2,5719	0,0000

Jacob

Interação	X1	X2	X3	Erro
01	1,0	2,8888	1,0	4,6082
02	1,1777	3,1111	2,2380	3,4636
03	0,7269	3,5040	2,3333	3,6355
04	0,7674	3,5858	2,5017	0,7674
05	0,7164	3,6375	2,5368	3,4877
06	0,7127	3,6548	2,5589	3,4769
07	0,7074	3,6626	2,5663	3,4792
08	0,7059	3,6657	2,5697	3,4788
09	0,7052	3,6670	2,5710	3,478962
10	0,7049	3,6675	2,5715	3,478960

2.a) $f(x) = x^3 - 6x^2 - x + 30x$

Bissecção

Interação	A	B	Raiz
01	-5,0	10	2,5
02	-5,0	2,5	-1,250
03	-1,25	2,5	0,6250
04	-1,25	0,63	-0,3125
05	-0,31	0,63	0,1563
06	-0,31	0,16	-0,0781

07	-0,08	0,16	0,0391
08	-0,0	0,04	-0,0195
09	-0,02	0,04	0,0098
10	-0,02	0,01	-0,0049

Secante

Interação	A	B	Raiz
01	-2,0	5,0	1,0
02	-2,0	1,0	0,3684
03	-2,0	0,37	0,1333
04	-2,0	0,13	0,0477
05	-2,0	0,05	0,0170
06	-2,0	0,02	0,0061
07	-2,0	0,01	0,0022
08	-2,0	0,01	0,0008
09	-2,0	0,01	0,0003
10	-2,0	0,01	0,0001

Falsa Posição

Interação	A	B	Raiz
01	-1,0	5,0	43,1429
02	-1,0	43,14	79,1649
03	-1,0	79,16	115,1711
04	-1,0	115,17	151,1740
05	-1,0	151,17	187,1756
06	-1,0	187,18	223,1767
07	-1,0	223,18	259,1774
08	-1,0	295,18	295,1780
09	-1,0	295,18	331,1784
10	-1,0	331,18	367,1787

Newton

Interação	A	Raiz
01	-2	10,8571
02	10,86	6,2911
03	6,29	-7,3302
04	-7,33	-3,1113
05	3,11	1,6626
06	1,66	2,5535
07	2,55	3,8403
08	3,84	6,4188
09	6,42	-5,1534

10	-5,15	1,1925
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b) $f(x) = 3x - \cos(x)$

Bisseccção

Interação	A	B	Raiz
01	-1,0	5,0	2,0
02	-1,0	2,0	0,5
03	-1,0	0,50	-0,25
04	-0,25	0,50	0,1250
05	0,13	0,50	0,3125
06	0,31	0,50	0,4063
07	0,31	0,41	0,3594
08	0,31	0,36	0,3359
09	0,31	0,34	0,3242
10	0,31	0,32	0,3184

Secante

Interação	A	B	Raiz
01	-1,0	5,0	0,3846
02	-1,0	0,38	0,0761
03	-1,0	0,08	0,0148
04	-1,0	0,01	0,0029
05	-1,0	0,00	0,0006
06	-1,0	0,00	0,0001
07	-1,0	0,00	0,0000
08	-1,0	0,00	0,0000
09	-1,0	0,00	0,0000
10	-1,0	0,00	0,0000

Falsa Posição

Interação	A	B	Raiz
01	-1,0	5,0	10,1242
02	-1,0	10,12	14,9633
03	-1,0	14,96	19,7623
04	-1,0	19,76	24,5716
05	-1,0	24,57	29,3667
06	-1,0	29,37	34,1298
07	-1,0	34,13	38,8813
08	-1,0	38,88	43,6428
09	-1,0	43,64	48,4050
10	-1,0	48,41	53,1525

Newton

Interação	A	Raiz
01	-1,0	-0,0784
02	-0,08	0,3315
03	0,33	0,3158
04	0,32	0,3168
05	0,32	0,3167

c) $f(x) = x + 2\cos(x)$

Bisseção

Interação	A	B	Raiz
01	-2,0	5,0	1,5
02	-2,0	1,5	-0,25
03	-2,0	-0,25	-1,125
04	-1,13	-0,25	-0,6875
05	-1,13	-0,69	-0,9063
06	-1,13	-0,91	-1,0156
07	-1,13	-1,02	-1,0703
08	-1,07	-1,02	-1,0430
09	-1,04	-1,02	-1,0293
10	-1,04	-1,03	-1,0361

Secante

Interação	A	B	Raiz
01	-2,0	5,0	0,3604
02	-2,0	0,36	-0,6799
03	-2,0	-0,68	-0,9916
04	-2,0	-0,99	-1,0270
05	-2,0	-1,03	-1,0297
06	-2,0	-1,03	-1,0299
07	-2,0	-1,03	-1,0299
08	-2,0	-1,03	-1,0299
09	-2,0	-1,03	-1,0299
10	-2,0	-1,03	-1,0299

Falsa Posição

Interação	A	B	Raiz
01	-2,0	-5,0	15,8428
02	-2,0	15,84	25,5757

03	-2,0	25,58	34,1909
04	-2,0	43,19	43,1391
05	-2,0	43,14	51,7381
06	-2,0	51,74	60,3871
07	-2,0	60,39	59,1047
08	-2,0	69,10	77,6361
09	-2,0	77,64	86,2897
10	-2,0	86,29	94,8900

Newton

Iteração	A	Raiz
01	-2,0	-0,5166
02	-0,52	-1,3349
03	-1,33	-0,8951
04	-0,90	-1,0950
05	-1,09	-1,0003
06	-1,00	-1,0436
07	-1,04	-1,0235
08	-1,02	-1,0328
09	-1,03	-1,0285
10	-1,03	-1,0305

d) $f(x) = x^3 - e^{2x} + 3$

Bissecção

Iteração	A	B	Raiz
01	-10,0	0,5	-4,75
02	-4,75	0,5	-2,125
03	-2,13	0,5	-0,8125
04	-2,13	-0,81	-1,4688
05	-1,47	-0,81	-1,1406
06	-1,47	-1,14	-1,3047
07	-1,47	-1,30	-1,3867
08	-1,47	-1,39	-1,4277
09	-1,47	-1,43	-1,4482
10	-1,45	-1,43	-1,4380

Secante

Iteração	A	B	Raiz
01	-10,0	0,50	0,4957
02	-10,0	0,50	0,4912
03	-10,0	0,49	0,4865
04	-10,0	0,49	0,4816

05	-10,0	0,48	0,4764
06	-10,0	0,48	0,4710
07	-10,0	0,47	0,4594
08	-10,0	0,47	0,4594
09	-10,0	0,46	0,4532
10	-10,0	0,45	0,4468

Falsa Posição

Interação	A	B	Erro
01	-5,0	0,50	0,4817
02	-5,0	0,48	0,4597
03	-5,0	0,46	0,4335
04	-5,0	0,43	0,4024
05	-5,0	0,40	0,3660
06	-5,0	0,37	0,3237
07	-5,0	0,32	0,2751
08	-5,0	0,28	0,2200
09	-5,0	0,22	0,1584
10	-5,0	0,16	0,0903

Newton

Interação	A	Raiz
01	-5,00	-3,3733
02	-3,37	-2,3367
03	-2,34	-1,7397
04	-1,74	-1,4851
05	-1,49	-1,4349
06	-1,43	-1,4331
07	-1,43	-1,4331
08	-1,43	-1,4331
09	-1,43	-1,4331
10	-1,43	-1,4331

f) $f(x) = 2x^3 + x^2 - 2$

Bissecção

Interação	A	B	Erro
01	-2,0	5,0	1,5
02	-2,0	1,50	-0,25
03	-0,25	1,50	0,6250
04	0,63	1,50	1,0625
05	0,63	1,50	0,8438
06	0,84	1,06	0,9531

07	0,84	0,95	0,8984
08	0,84	0,90	0,8711
09	0,84	0,87	0,8574
10	0,86	0,87	0,8643

Secante

Interação	A	B	Erro
01	-5,0	2,0	1,4857
02	-5,0	1,49	1,2980
03	-5,0	1,30	1,1874
04	-5,0	1,19	1,1131
05	-5,0	1,11	1,0598
06	-5,0	1,06	1,0199
07	-5,0	1,02	0,9892
08	-5,0	0,99	0,9652
09	-5,0	0,97	0,9461
10	-5,0	0,95	0,9307

Falsa Posição

Interação	A	B	Erro
01	-2,0	1,0	27,9231
02	-2,0	27,92	55,9319
03	-2,0	55,93	83,9341
04	-2,0	83,93	111,9351
05	-2,0	111,94	139,9357
06	-2,0	139,94	167,9360
07	-2,0	167,94	195,9363
08	-2,0	195,94	223,9364
09	-2,0	223,94	251,9366
10	-2,0	251,94	279,9367

Newton

Interação	A	Raiz
01	2,0	1,3571
02	1,36	1,0055
03	1,01	0,8762
04	0,99	0,8584
05	0,86	0,8581
06	0,86	0,8581
07	0,86	0,8581
08	0,86	0,8581
09	0,86	0,8581

10	0,86	0,8581
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f) $f(x) = e^{\cos(x)} + x^3 - 3$

Bisseccção

Interação	A	B	Erro
01	-2,0	5,0	1,5
02	-2,0	1,50	-0,25
03	-0,25	1,50	0,6250
04	0,63	1,50	1,0625
05	1,06	1,50	1,2813
06	1,06	1,50	1,1719
07	1,06	1,28	1,1172
08	1,12	1,17	1,1445
09	1,12	1,14	1,1309
10	1,13	1,14	1,1377

Secante

Interação	A	B	Erro
01	-5,0	2,00	1,7006
02	-5,0	1,70	1,5559
03	-5,0	1,56	1,4650
04	-5,0	1,46	1,4015
05	-5,0	1,40	1,3545
06	-5,0	1,35	1,3184
07	-5,0	1,32	1,2890
08	-5,0	1,29	1,2668
09	-5,0	1,27	1,2480
10	-5,0	1,25	1,2324

Falsa Posição

Interação	A	B	Erro
01	-2,0	5,0	26,1384
02	-2,0	26,14	46,8344
03	-2,0	46,83	67,5199
04	-2,0	67,52	88,2031
05	-2,0	88,20	108,8852
06	-2,0	108,89	129,5669
07	-2,0	129,57	150,2484
08	-2,0	150,25	170,9297
09	-2,0	170,93	191,6108
10	-2,0	191,61	212,2920

Newton

Interação	A	Raiz
01	-5,0	-3,2819
02	-3,28	-2,1047
03	-2,10	-1,2557
04	-1,26	-0,6556
05	-0,66	0,2488
06	-0,25	0,2060
07	0,21	0,5849
08	-0,58	-0,1940
09	-0,19	0,3474
10	0,35	-0,4323

g) $f(x) = 0.1x^3 - e^{2x} + 2$

Bissecção

Interação	A	B	Erro
01	-2,0	0	-1,0
02	-2,0	-1,0	-1,5
03	-1,5	-1,0	-1,250
04	-1,25	-1,0	-1,1250
05	-1,25	-1,13	-1,1875
06	-1,25	-1,19	-1,2188
07	-1,25	-1,22	-1,2344
08	-1,25	-1,23	-1,2422
09	-1,24	-1,23	-1,2383
10	-1,24	-1,24	-1,2402

Secante

Interação	A	B	Erro
01	-5,0	0,0	0,0403
02	-5,0	-0,04	-0,0834
03	-5,0	-0,08	-0,1291
04	-5,0	-0,13	-0,1771
05	-5,0	-0,18	-0,2273
06	-5,0	-0,23	-0,2792
07	-5,0	-0,28	-0,3326
08	-5,0	-0,33	-0,3869
09	-5,0	-0,39	-0,4418
10	-5,0	-0,44	-0,4967

Falsa Posição

Interação	A	B	Erro
01	-2,0	5,0	26,1384
02	-2,0	26,14	46,8344
03	-2,0	46,83	67,5199
04	-2,0	67,52	88,2031
05	-2,0	88,20	108,8852
06	-2,0	108,89	129,5669
07	-2,0	129,57	150,2484
08	-2,0	150,25	170,9297
09	-2,0	170,93	191,6108
10	-2,0	191,61	212,2920

Newton

Interação	A	Raiz
01	-5,0	-3,2819
02	-3,28	-2,1047
03	-2,10	-1,2557
04	-1,26	-0,6556
05	-0,66	0,2488
06	-0,25	0,2060
07	0,21	0,5849
08	-0,58	-0,1940
09	-0,19	0,3474
10	0,35	-0,4323

$$h) f(x) = x^3 - 5x^2 + x + 3$$

Bissecção

Interação	A	B	Erro
01	-5,0	10,0	2,5
02	2,5	10,0	6,25
03	2,5	6,25	4,3759
04	4,38	6,25	5,3125
05	4,38	5,31	4,8438
06	4,38	4,84	4,6094
07	4,61	4,84	4,7266
08	4,61	4,73	4,6680
09	4,61	4,67	4,6387
10	4,64	4,67	4,6533

Secante

Interação	A	B	Erro
01	-10,0	5,0	4,9208
02	-10,0	4,92	4,8616
03	-10,0	4,86	4,8165
04	-10,0	4,82	4,7816
05	-10,0	4,78	4,7543
06	-10,0	4,75	4,7328
07	-10,0	4,73	4,7157
08	-10,0	4,72	4,7021
09	-10,0	4,70	4,6912
10	-10,0	4,69	4,6825

Falsa Posição

Interação	A	B	Erro
01	-10,0	5,0	15069,9733
02	-10,0	15069,97	30139,9733
03	-10,0	30139,97	45209,9733
04	-10,0	45209,97	60279,9733
05	-10,0	60279,97	75349,9733
06	-10,0	75349,97	90419,9733
07	-10,0	90419,97	105489,9733
08	-10,0	105489,97	120559,9733
09	-10,0	120559,97	135629,9733
10	-10,0	135629,97	150699,9733

Newton

Interação	A	Raiz
01	-10,0	-6,2419
02	-6,24	-3,7947
03	-3,79	-2,2434
04	-2,24	-1,3169
05	-1,32	-0,8383
06	-0,84	-0,6694
07	-0,67	-0,6462
08	-0,65	-0,6458
09	-0,65	-0,6458
10	-0,65	-0,6457

i) $f(x) = 2x - \sin(x) + 4$

Bisseccção

Interação	A	B	Erro
01	-5,0	2,0	-1,5
02	-5,0	-1,50	-3,25
03	-3,25	-1,50	-2,3750
04	-2,38	-1,50	-1,9375
05	-2,38	-1,94	-2,1563
06	-2,38	-2,16	-2,2656
07	-2,38	-2,27	-2,3203
08	-2,38	-2,32	-2,3477
09	-2,38	-2,35	-2,3613
10	-2,36	-2,35	-2,3545

Secante

Interação	A	B	Raiz
01	-10,0	0,50	0,4957
02	-10,0	0,50	0,4912
03	-10,0	0,49	0,4865
04	-10,0	0,49	0,4816
05	-10,0	0,48	0,4764
06	-10,0	0,48	0,4710
07	-10,0	0,47	0,4594
08	-10,0	0,47	0,4594
09	-10,0	0,46	0,4532
10	10,0	0,45	0,4468

Falsa Posição

Interação	A	B	Erro
01	-5,0	0,5	33,8676
02	-5,0	33,87	72,3368
03	-5,0	72,34	110,6815
04	-5,0	110,68	148,9920
05	-5,0	148,99	187,2895
06	-5,0	187,29	225,5825
07	-5,0	225,58	263,8750
08	-5,0	263,88	302,1686
09	-5,0	302,17	340,4630
10	-5,0	340,46	278,7570

Newton

Interação	A	Raiz
01	0,5	12,4724
02	12,47	9,9422
03	9,94	7,6873
04	7,69	5,2424
05	5,24	2,0024
06	2,0	-0,9292
07	-0,93	0,9970
08	1,0	-10,3502
09	-10,35	-12,1452
10	-12,15	-13,7304

j) $f(x) = 10^x + x^3 + 2$

Bissecção

Interação	A	B	Erro
01	-5,0	0,50	-2,25
02	-2,25	0,50	-0,8750
03	-2,25	-0,88	-1,5625
04	-1,56	-0,88	-1,2188
05	-1,56	-1,22	-1,3906
06	-1,39	-1,22	-1,3047
07	-1,30	-1,22	-1,2617
08	-1,30	-1,26	-1,2832
09	-1,28	-1,26	-1,2725
10	-1,27	-1,26	-1,2671

Secante

Interação	A	B	Erro
01	-5,0	0,5	0,2733
02	-5,0	0,27	0,1114
03	-5,0	0,11	-0,0219
04	-5,0	-0,02	-0,1385
05	-5,0	-0,14	-0,2439
06	-5,0	-0,24	-0,3407
07	-5,0	-0,34	-0,4305
08	-5,0	-0,43	-0,5141
09	-5,0	-0,51	-0,5918
10	-5,0	-0,59	-0,6641

Falsa Posição

Interação	A	B	Erro
01	-2,0	5,0	16,9803
02	-2,0	16,98	28,9603
03	-2,0	28,96	40,9403
04	-2,0	40,94	52,9203
05	-2,0	52,92	64,9003
06	-2,0	64,90	76,8803
07	-2,0	76,88	88,8803
08	-2,0	88,86	100,8403
09	-2,0	100,84	112,8203
10	-2,0	112,82	124,8003

Newton

Interação	A	Raiz
01	2,0	1,5459
02	1,55	1,0824
03	1,08	0,5925
04	0,59	-0,0158
05	-0,02	-1,3503
06	-1,35	-1,2754
07	-1,28	-1,2711
08	-1,27	-1,2711
09	-1,27	-1,2710
10	-1,26	-1,2710